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Sketches from the old Brooks House, Medford, Mass.
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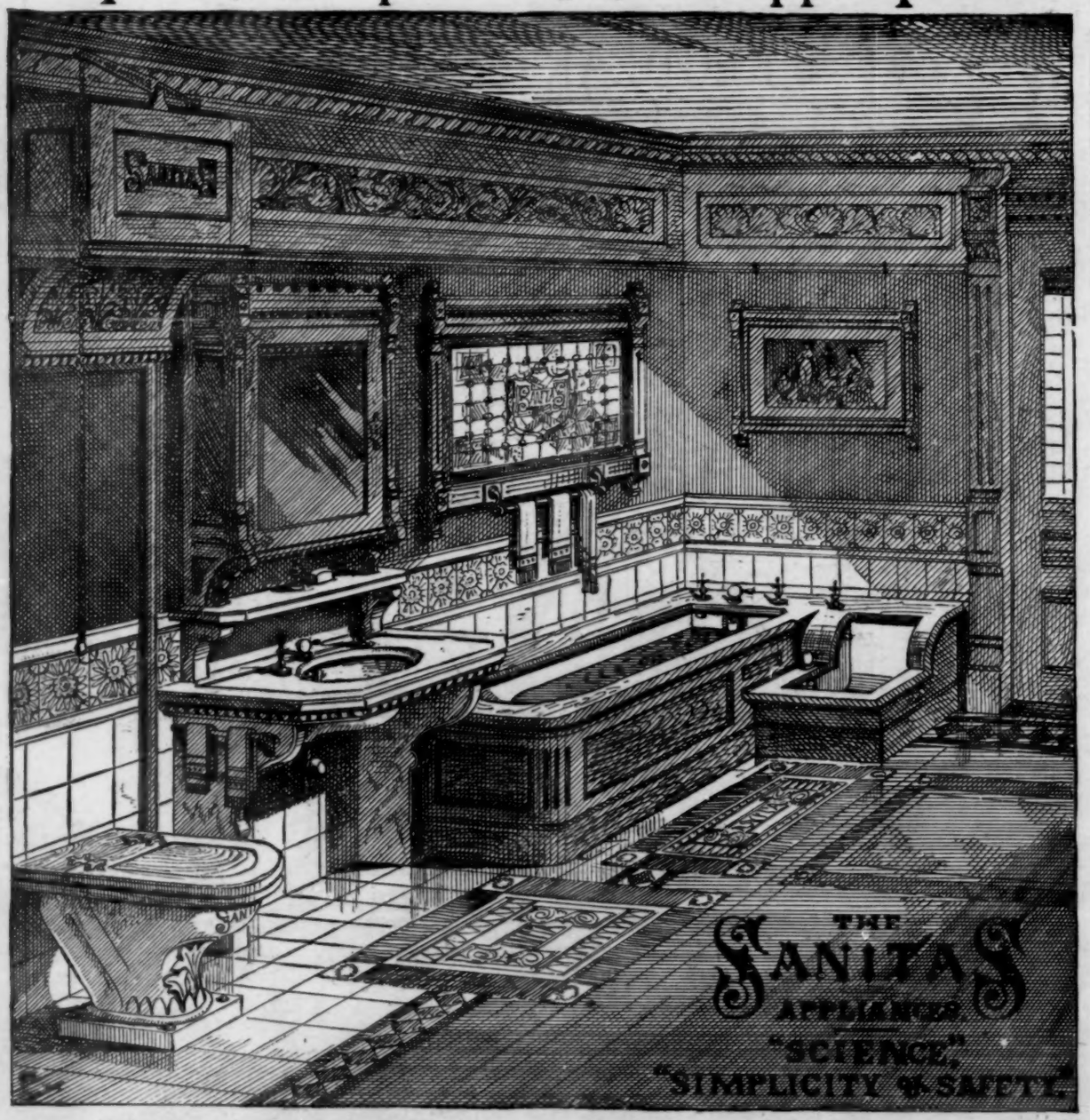
House at Denver, Col.
Dining-room and Reception-room in House at New York.

VIEW OF BATH-ROOM FITTED UP WITH THE

SANITAS ✿ PLUMBING ✿ APPLIANCES



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THE Congressional Library muddle has been still more confused by a vote of the Senate, refusing to concur with the House of Representative in ordering work on the building to be stopped, and proposing as a substitute, that it should go on, but for the future under the supervision of engineer officers of the army. While such supervision would be better than that of a commission of amateurs perfectly ignorant of the work which they control, it would be more costly, and much less suited to secure creditable results in the way of arrangement and details of design than the supervision of the architect who is responsible for the plan. This is the sort of supervision which is employed in all civilized countries in similar cases, and is found to be most satisfactory and economical; and no one has yet explained why the same method should not be found most suitable in this country. In the debates in Congress it is darkly hinted that "jobs" exist under the surface of the contracts for the Library, and the importation of army officers seems to be intended as a menace to civilian corruption. In our own mind, we are satisfied that no dishonest intention has ever entered the minds of either the architect or the Commissioners. In reading the "charges" and counter-charges, rumors, hints and innuendoes about men in high public station in this country, we are often reminded of Cardinal Mazarin's remark to an official colleague, who was greatly disturbed by the accusations of corruption rained upon them in the newspapers. "Don't pay any attention to them," said the minister, "these people are only showing what they would do if they were in our places;" and we have not yet seen, in the printed accounts of the Library affairs, any indication whatever of anything worse than foolishness and ignorance on the part of the Commissioners, and a lack of deference to the feelings of disappointed bidders on the part of the architect. The scandals about the employment of women as "drivers of carts," and so on, ought evidently to be laid at the door of subordinates, who are, to say the least, not too carefully selected by politicians anywhere, and least of all in Washington; and the best way to avoid them is certainly to give the architect the customary fees, and let him pay out of his own pocket such computers, tracers, and other assistants as he requires, while the contractors pay their men, and are themselves paid by the yard, perch, square or other suitable measure for the work they do, which can be readily measured, and the prices approved by army, or other engineers, if Congress is not willing to trust Mr. Smithmeyer, before the payments under the contract are made. As to the plan of the building, which some of the newspapers still object to, we can only repeat that it has been chosen by the official representatives of the Government out of a considerable number of competing designs, and authoritatively adopted, and if it is now to be modified the Government should bear the expense — not Mr. Smithmeyer, who has simply obeyed orders. To bring up the ideas of Mr. Poole, of Chicago, as a reason for depriving Mr. Smithmeyer of his great commission is both unfair and mean. All architects know that Mr. Poole and Mr. Spofford, the Librarian of Congress, and a member of the original Commission which selected the plan, differ radically in their ideas of the proper arrangement of such a building, and if Mr. Smithmeyer, as is not denied, followed the programme which Mr. Spofford, both as the head of the Library itself and a member of the Commission, imposed upon him, he has only done his duty, and Mr. Poole himself, however erroneous he may think this programme, would, we are sure, be the last to wish to see his criticisms used as a handle for dislodging the man who faithfully and intelligently followed it. The *Philadelphia Press* proposes the appointment of a mixed Commission of architects and librarians to prepare new plans, to be substituted for those adopted by the original commissioners; and there is some merit in the idea of retracing the steps that have already been taken, and beginning afresh, with just such a jury to decide upon plans as ought to have decided upon them in the first place; but this can, and should be done without injury to Mr. Smithmeyer, and both he and Mr. Spofford, the two men who understand the problem best, ought to be members of the new commission, if there is to be any.

THE New York Architectural League has issued a very timely notice of its exhibition of work in architecture and the allied fine arts, which is to be held next winter, commencing December 27, 1888, and closing January 12, 1889, at the galleries No. 368 Fifth Avenue. The League invites architects, artists, sculptors, decorators, and workers in wood, metal and textiles, to contribute examples, and reminds them that a large space is at the disposal of the managers, and that by giving notice so long beforehand they will have ample time to consider their contributions. The League exhibitions have now become important events, calling out a great deal of interesting and beautiful decorative work, as well as architectural drawings, and the next one promises to surpass all that have preceded it. Detailed information, and blanks for intending exhibitors, may be obtained from the Secretary, Mr. F. A. Wright, 47 Liberty Street, New York. It is, by the way, intended to establish the League in a house of its own before long. A scheme has already been prepared for assuring the income required for meeting rent and expenses, and the members look forward to a future of greatly increased usefulness for their energetic society.

THE *Sanitary News* describes a new plumber's trick, which has been first discovered in Milwaukee, but may be known elsewhere, so that architects and inspectors will do well to be on their guard against it. In Milwaukee, as in many other towns, all soil-pipes put up in dwelling-houses must be tested by filling with water. A certain firm, knowing that a defective pipe had been used, contrived to plug it with clay, so that the water applied for testing it did not enter the pipe at all. It is not stated how the inspector happened to find out this ingenious deception, but plumbing inspectors become wonderfully expert in observing suspicious indications, and the offending firm was reported, and punished by having its license revoked until the defective pipe should be replaced by a new one. Most persons will say that the revocation of the license ought to have been made permanent.

THE *Sanitary News* mentions also a piece of public sanitation which ought to be made as widely known as possible.

People who read the newspapers will remember the angry discussion over the employment of bromine by the New York Board of Health, to disinfect the foul earth thrown out of street excavations; and the *Sanitary News*, in speaking of this, recalls the fact that a few years ago, during an epidemic of diphtheria and scarlet-fever in Detroit, Dr. O. W. Wight, the famous health officer of that city, determined to disinfect the sewers. For this purpose seventy-four thousand pounds of sulphate of iron were dissolved and poured into the sewers, and three tons of sulphur were burned in iron pails, lowered into them. Besides the cleansing of the channel, due to the

iron sulphate, the sulphurous-acid vapors from the burning brimstone penetrated the whole system of sewers and house connections, and the result was a great abatement of diphtheria, and the almost entire disappearance of scarlet-fever. We hope that this experiment, which is not so generally known as it should be, will be frequently and extensively repeated in other places. Even by the scale of the political economists, an average American child is worth a great many tons of brimstone and copperas, and the whole cost of the Detroit disinfection would be returned with a profit by the saving of a single life; while, if the results should generally agree with those obtained by Dr Wight, we might even hope, by systematic efforts, made simultaneously in our great cities, to accomplish, what physicians tell us is possible, — the complete extirpation from civilized countries of diphtheria, scarlet-fever and membranous croup, three of the worst diseases that afflict mankind.

THE New York Board of Health, which controls all plumbing work in that city, has adopted a new specification, or code of rules, for house-plumbing, which went into effect July 1, and, as it will be strictly enforced, it is worth knowing something about. The most interesting point is, perhaps, the total exclusion of ordinary soil-pipe from dwelling-houses in New York, by a clause demanding under all circumstances the quality known to the trade as "extra heavy," the minimum weight of which, for four-inch pipe, is set at thirteen pounds per foot. The rust-joints in iron pipe, once permitted, are now forbidden, and it is not even allowed to use old lead in making calked joints, the code expressly demanding for this purpose "pure, soft pig-lead." In other respects the rules are not materially different from the old ones.

MR. GEORGE AITCHISON, a very good authority, reviews in the *Builder* the discourse of Mr. William Morris, in a recent number of the *Fortnightly Review*, on the "Revival of Architecture." It is hardly necessary to say that Mr. Morris does not think that architecture can be suitably revived except by copying Gothic forms again, and Mr. Aitchison, while he is enough of an architect not to believe that architectural beauty is limited to buildings with one peculiar set of details, is inclined to think that the spirit of the present age is so much opposed to architectural art that there is no hope of its revival until strong public feeling, excited by some great event, or series of events, shall seek expression in great monuments; and the best comfort he can offer to architects who try to train themselves to the utmost in their art is that they do well to be ready in case the wave of enthusiasm should occur in their time. "At present," he says, "the only question that interests mankind is, whether their buildings can be built quickly, and are cheap," and, further, "So intent have we been on our problems, — perfecting steam-engines, boring hills, bridging valleys, producing artificial light, and communicating instantly with the uttermost parts of the earth, — so eager have we been to get rich, that we have overlooked beauty, and so surrounded have we been with every form of ugliness that we have grown callous."

THERE is no question of the truth of the notion that epochs of great art follow some period of peculiar exaltation of public sentiment. Without the terror and despondency which fell upon the Athenians at the approach of the countless hosts of the Persians, and the sudden revulsion to joy at their deliverance, and patriotic pride in their own bravery, and gratitude to their divine protectors, which followed the victories of Marathon and Salamis, we may be sure that the Parthenon and the Erechtheum would never have been built, and the remark with which the Athenians appropriated to themselves the fund accumulated by the allied States for the common defence against the Persians — that their prowess had made the fund unnecessary — shows, if not the honesty, at least the condition of exultation and enthusiasm which was to find vent in the purest architecture and the noblest sculpture that the world has yet seen. In much the same way in England, the providential dispersion of the dreaded Spanish Armada, assisted, perhaps, by the immense plunder brought home by Drake and his friends, was followed by the wonderful period of Elizabethan domestic architecture, and, midway between the two others, the great Gothic epoch of the thirteenth century was also particularly the age of emancipation from the ignorance and slavery of the Dark Ages. For all this, we cannot ourselves quite believe that the people of the nineteenth century are doomed to wait for an incursion of barbarians before they can build beautiful houses and churches, and, furthermore, we are not entirely convinced of the unapproachable superiority of the antique and mediæval architecture over our own. We do not always remember that the Greeks, the Romans and Freemasons worked upon a traditional type, in a way that is impossible for us. Not having to trouble themselves about anything but the details that they were to apply to a structure, the lines or arrangements of which had been previously fixed for them, they had time to bring those details to great perfection. We have ample evidence that when they deviated much from the routine in which they had been brought up, they made slips in design quite as bad as any that a modern architect would be guilty of, and that the development of a style was a development by small steps, each clever man using what had been done before him, but conveying into it a little additional perfection from his own taste or ingenuity. That their example should discourage us is anything but reasonable. It is true that we have no fixed type of architecture, but if we have not that, we have what is better, a far more catholic taste and cultivation than our ancestors. A well-trained architect of the present day is fitted, by his study of antique elegance, to give his buildings a purity of outline which few of the mediævals had any conception of, while his enjoyment of Gothic light and shade enable him to give to his Classical designs a picturesque effectiveness that would have puzzled a Roman. Moreover, if he is one of the very modern school, he will have acquired from the Orientals a color sense which seems to have been hitherto very little cultivated in Europe, and, if his knowledge of sculpture is not equal to that of the Greeks, it is at least superior to that of any Gothic architect. To bring these gifts and acquirements into effective use, the main thing needful is, as Mr. Aitchison and Mr. Morris would probably agree, a strong sentiment, in the expression of which they should do their best to coöperate. To be capable of being inspired with such a sentiment it is not necessary for an architect to engage in preliminary wars and agitations, although these might give intensity to his feelings. All that is really required is a sympathetic disposition, constant and accurate observation to detect the relation of architectural forms and motives to mental emotions, and a contempt for the cynical worldliness which tries to prevent men from showing their feelings. To be a first-rate architect, as well as a painter, sculptor or novelist, one must have a heart, and must also be modest and truthful enough to be willing to show what is in it to other people, and earnest enough to find one's purest reward in awakening a throb of sympathy with the sentiment one has endeavored to express. There is no want of sentiments for architecture to convey. The pure and tender domesticity of Mr. Nesfield's buildings, or Mr. Norman Shaw's earlier ones, might be emulated in every house to advantage, and, judging by their popularity, the effort would not be wasted. In the design of churches, while the small mediæval examples show us often a quiet, hallowed charm, and the large ones a solemn gravity, which might be reproduced in other forms, the present age has plenty of new and perhaps more active religious sentiments, which can be investigated in evangelical society, or among the heroic soldiers of the Salvation Army, or in the deliberations of a Pan-Anglican Council, or amid the privations of a missionary station, and would well bear to be remembered in the fabrics which modern Christianity is to raise for the worship of Him who is the source of all Christian sentiment in every age.

THE plan for a great suspension bridge across the Hudson River, twenty-seven hundred feet in span, which is now under consideration before a Government commission, and will probably be carried into execution if the commission does not disapprove it, is, it appears, far surpassed, at least in span, by certain telegraph cables, which have only their own weight to bear. In the Madras Presidency, in India, the River Kistna is crossed by a cable, swung between supports five thousand and seventy feet apart, and one has just been put up in China, forty-six hundred and forty-eight feet in span. The versed sine of the curve formed by this cable is five hundred and fourteen feet. The whole weight of the suspended portion is only six and one-half tons, and the breaking resistance fifteen thousand pounds, so that there would seem to be no great difficulty, by building the supports high enough, in bridging almost any chasm by similar ropes, and establishing foot-ways between them.

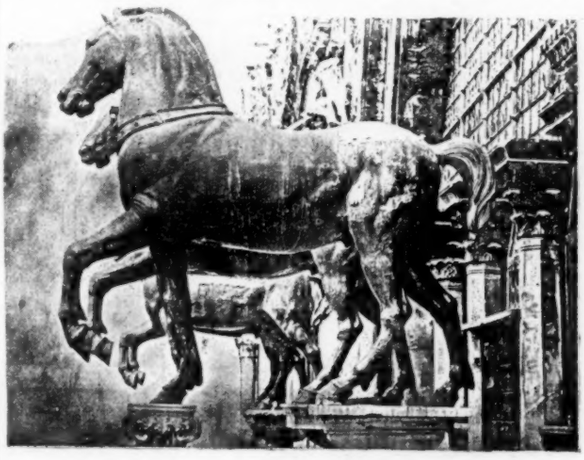
EQUESTRIAN MONUMENTS. — II.

THE HORSES OF ST. MARK'S.

From a Vase.

AMONGST the existing antiques which have a correlative interest for us are the bronze horses of St. Mark's, sometimes ascribed to Lysippus of Sicyon, a contemporary of Alexander the Great, and one of the most skilled of workers in bronze that ever lived. His skill, to which these famous horses bear witness, was fully equalled by his industry, for he is credited with the production of 1500 bronze statues whose character may be inferred from the size and artistic importance of those which are known to us by name, such as the colossal figure of Zeus at Tarentum, sixty feet in height, a colossal Hercules at the same place, which was transported to Rome by Fabius Maximus; while the Farnese Hercules by Glycon, and the Torso of the Belvedere are thought to be copies from originals by him. The large number of his works rests perhaps on the legendary statement that it was his practice to lay aside in a particular place a single piece of gold for every statue he sold, and that at his death 1500 pieces of gold were found in this repository. If the tale be founded in fact there is here a record only of those statues that he had the good luck to sell, and there is no knowing how many remained unsold. Where are they now, these masterpieces? To what base uses have they been put? In what unrecognizable forms do their imperishable particles serve us to-day? Coined into money to liquidate the pay-rolls of the cohorts that destroyed them; cast into medals to commemorate the fall of the cities which they formerly ornamented, some of them to-day must be represented in the cabinets of European numismatists, side by side with other medals which record on their faces the actual appearance of the perished originals. That so vast a number of bronzes should have vanished is extraordinary enough, but this marvel must be multiplied a thousand-fold before it is possible to measure the loss that in this particular alone the greed and ambition of nations have inflicted on posterity; for when we trace the course of events we discover that the sculptured treasures of Grecian cities were destroyed, and the selected ones preserved, by the Romans under Mummius, Metellus and Sylla, and afterwards at Rome endured the fate that befell native Roman treasures; while those left in Greece first endured the assaults of Christian reformers and at a later date the attacks of the iconoclasts. Then, during the crusades, Baldwin, checked in his passage to the Holy Land, not only subdued Byzantium but overran parts of Greece, and his northern hordes are credited with destroying the Jupiter Olympus, the Juno of Samos, and the Minerva Parthenos, which had till then been preserved at Byzantium. Next, in 1312, the Spaniards attacked the Grecian empire, and not many years later had to yield on the same battle-fields to the victorious Venetians. In 1453, the Moslems under Mahomet II, had their innings and faithful in the interpretation of the Koran destroyed what sculptures could be found.[2] From that time onwards the constant struggles between Turks, Venetians and Greeks carried war and rapine into every part of the land that once felt the influence of Greek art, and as these constant struggles caused men to turn their thoughts more to arms than to intellectual pursuits the æsthetic senses of succeeding generations became more and more blunted, while the Greek of pure strain was either destroyed by the sword, or so polluted by inter-marriage with the military scum that succeeding devastators had left behind, that small wonder can be felt when the resulting mongrel shows so little regard for the works of those from whom he professes to claim descent as to feel that to make lime out of sculptured marble is a legitimate, a natural and a praiseworthy act. It is then a matter for gratitude that the earlier invaders removed some of the plastic treasures of Grecian art, and among them the Horses of St. Mark's, which were removed by the Venetians from the hippodrome at Byzantium after the fourth Crusade, in 1208, and for centuries have with stately grace been stepping off into space from their positions over the portico of St. Mark's.

They are notable works of art whoever wrought them, and their fame has for ages sounded through the world, so that there was every reason why Napoleon in 1797 should add them to the "bag" he attempted to make of all the art-treasures of Europe, with the object of making Paris the glory of the world in this particular as he intended it should be in every other. How these weighty animals were dismounted our illustration shows,[3] and another[3] shows them as forming part of a triumphal procession which is here shown entering the Champ de Mars on the 9th Thermidor, year VI of the Republic [July 27, 1798]. The inscription on the car that bore them was: "*Chevaux transportés de Corinth à Rome, et de Rome à Constantinople, et de Constantinople à Venise, et de Venise en France,*" and the further assurance: "*Ils sont enfin sur un terre libre.*" It has not been possible to discover where the horses were bestowed until they were hoisted to the top of the Arc du Carrousel, which was not built until 1806, and harnessed to a chariot of gilded lead, which was intended to bear the emperor in his coronation robes. In this place they remained for about ten years. But one of the things that early claimed the attention of the allies was to take steps for the return to their former resting places of the artistic spolia which



The Horses of St. Mark's.

the great conqueror had gathered, and so in 1815 the bronze horses of St. Mark were on their way back to Venice, stopping at Vienna on the way, and were soon hoisted to their present position. Of them Goethe, who does not boast a deep knowledge of the living animal, exclaims: "A glorious team of horses, — I should like to hear the opinion of a good judge of horse-flesh. What seemed strange to me was, that closely viewed, they appear heavy, while from the piazza below they look light as deer."

And Samuel Rogers sings:

> "In this temple porch
> Old as he was, so near his hundredth year,
> And blind — his eyes put out — did Dandolo
> Stand forth, displaying on his crown the cross.
> There did he stand, erect, invincible,
> Though wan his cheeks, and wet with many tears,
> For in his prayers he had been weeping much;
> And now the pilgrim and the people wept
> With admiration, saying in their hearts,
> 'Surely those aged limbs have need of rest!'
> There did he stand, with his old armor on,
> Ere gonfalon in hand, that streamed aloft,
> As conscious of its glorious destiny,
> So soon to float o'er mosque and minaret,
> He sailed away, five hundred gallant ships,
> Their lofty sides hung with emblazoned shields,
> Following his track to fame. He went to die
> But of his trophies four arrived ere long,
> Snatched from destruction — the four steeds divine,
> That strike the ground, resounding with their feet,
> And from their nostrils snort ethereal flame
> Over that very porch."

Another poet, "Owen Meredith," has found this a noteworthy incident and in elaborating it he makes use of a method that has been followed by many of his craft, both ancient and modern, and endows his beasts with speech.

[1] Continued from No. 657, page 38.

[2] There were at one time in St. Sophia 426 statues.

[3] From "*Tableaux Historique de la Revolution,*" published in 1804.

"At midnight, in the murtherous streets, the dew
Was blood-red, and the heavens were hurt with sounds
Of shriek and wail the ransacked region round.
So that men heard not, in the Hippodrome,
Those Four Bronze Horses, that had come from Rome,
In conference, talking each to each.

"One said:
'Our purple-mantled master, Power, is fled,
And how shall we four fare? Let us away
Thro' the thick night! For ever since the day
We followed that great Western Cæsar home
To grace the glories of Augustine Rome,
We four have felt no hand upon our manes
Less great than their's, who grasp the golden reins
Of Empire; they behind whose chariot wheel
Yet burning ruts their burning course reveal,
Who rode the rolling world. We also, when
Power pass'd from Rome, his car drew here again,
And carried Conquest in his course divine
From West to East, to dwell with Constantine.
But now is Power departed, who knows where?
Out of the East!'

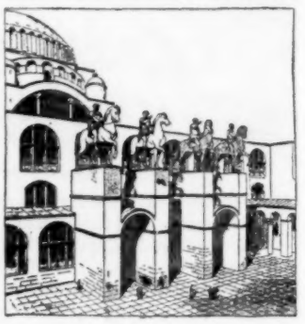
"So spake that voice in air.
The others answered 'Whither shall we go?
Our master being gone? For who doth know
Where we may find him?'

XII.

"AND THE LION OF ST. MARK,

Listening in the dark,
To these replied the Lion of St. Mark.
'Power rideth on my wings. Come also ye
Whither I go, across the vassal sea.
And let us bear with us, to please him well,
Beauty, the spouse of Power. And we will dwell
Together.'
Then they answered 'Even so,
Lion! and where thou goest, we will go.'
So those Five Beasts went forth."[1]

been hoisted up and lowered down more than once to satisfy the whim or self-glorifying instincts of one potentate or another: from which it is plain that even in ancient times this famous quartet were held in highest honor. The chronicles of Scivos and Magno give the earliest information about them by recording that Augustus Cæsar brought them from Alexandria after his victory over Antony, and set them up on a triumphal arch at Rome; and used for this purpose once, succeeding emperors, Nero, Domitian, Trajan used them in turn to adorn other arches built in their own honor. At Rome, then, they remained for some three hundred years, harnessed now to one form of triumphal chariot and now to another, until Constantine decided to transfer the capital of his mighty empire to a new seat, and not unnaturally packed up these much-prized horses with the other works of art with which he proposed to adorn his new city on the Thracian Bosphorus.



Suggestion as to Treatment of the Exonarthex of St. Sophia's.

The pedigree of these steeds of noble strain is, then, of the longest and it lacks only a few centuries of being complete — from the time of their probable founding in the workshop of Lysippus, about 350 B.C., to the death of Antony, 30 B.C. By what route they reached Alexandria, by sea direct or overland by Asia Minor and Syria, is open to conjecture. Perhaps as

French Troops removing the Bronze Horses from St. Mark's, Venice, in 1797.[2]

These horses are commonly believed to have been taken from the hippodrome at Byzantium, but they may have occupied a somewhat similar position to that they now hold, for the accompanying sketch by Viollet-le-Duc, with which he illustrates his suggestion as to the possible treatment of the exonarthex of St. Sophia, suggests that the horses of St. Mark's may once have held guard, even if riderless, over the entrance to some pagan temple or basilica of the Eastern church.

But though it is quite commonly known that they came from Byzantium to Venice, it is not so generally known that these much-travelled steeds had visited Italy before, and had Antony met Cleopatra in Cilicia and there succumbed to her charms, he may, if the group was a love-token, have scoured the neighboring country for its choicest treasure and may have found these already travelled statues in some neighboring town; or he may have sent agents to Corinth to secure them, for Corinth is by some believed to have been their original home. At any rate, the beholder may please his fancy as he will by constructing an itinerary which will only add to their renown as horses who have covered only less space than those driven by the sun-god.

Apart from their artistic value, aside from their history, these horses are singular in one other particular. Horses modelled in the round are not infrequently adjuncts of architectural

[1] From Owen Meredith's (Robert, Lord Lytton), "*Siege of Constantinople.*"

[2] From "*Tableaux Historiques de la Revolution Française.*"

decoration, so their position over the doorway of St. Mark's does not especially attract the attention, but they are amongst equestrian statues unique in the character of their support. In his "*Brick and Marble in the Middle Ages*," George Edmond Street says: "I never leave St. Mark's without taking one look at least at the four bronze horses, which, placed as they are on columns high above the ground, add so much to the strange character of the west front, and are in themselves such exquisite examples of their kind. Strange ornaments these for the façade of the chief church of a city where horse's feet have hardly ever trod! Equally strange, if you are to have horses in such a position at all, is the way in which these are supported. They stand balancing themselves nicely on the caps of small columns. Extremes meet; and I am not so sure but that this extraordinary arrangement is not better than that which is usually adopted. If horses are to be supported above the ground, they may almost as well be so in this way as on the ordinary pedestal, which looks equally unsafe if the bronze is instinct with life."

Mr. Street seems not to have known that in spite of their insular position the Venetians were great lovers of horses and bred them — on the mainland — in great numbers, probably brought to this necessity by their being so frequently embroiled in Renaissance times with the neighboring powers in the north of Italy. The fame of Venetian horsemen was such that they were employed in numbers in the hippodrome of Constantinople, and during the famous factional troubles that had their seat of action in the hippodrome these Venetians gave their name to one of the factions. At any rate, the Venetians held these horses in special veneration and this fact was known to all men, and when in 1379 the Genoese fleet under Pietro Doria was besieging Venice and the city found itself in more desperate strait than ever before and sued for peace on any terms, he could think of no more fitting taunt with which to couple his rejection of their overture than to declare that he would not make peace till with his own hands he had bridled the bronze horses of St. Mark's. But fortune turned against him, and city and horses were spared this ignominy.

[To be continued.]

BUILDERS' HARDWARE.[1] — II.

METALS AND VARIETIES OF FINISH.

From *La Semaine des Constructeurs.*

BEFORE beginning a study of any portion of the subject, an attempt will be made to consider the metals used for builders' hardware and the various styles of finish possible in connection with them.

Iron is naturally the first material thought of. In its purest form it is known as wrought-iron, a term which is derived from the fact that in the earliest processes the iron was beaten while hot and the impurities forced out by the blows. Also the name indicates, to an extent, the nature of the material, which is yielding and pliable rather than brittle or hard. Wrought-iron is the most available material for constructive metal-work. Nails, bolts, ties, anchors, etc., are more naturally made of wrought-iron than of any other material. Nearly all strap-hinges and the best makes of common butts are made of it; also, for some forms of common bolts and any article of hardware which permits the metal being punched or pressed into shape, wrought-iron is more suitable than cast, and is much used on account of its superior strength. For finished work, such as knobs, plates, etc., there is very little wrought-iron hardware in the market. A good deal of it is made to order in the shape of ornamental hinges, straps and braces, but the amount of work involved in producing any given pattern is so largely in excess of what the same amount of work would produce in other metals that wrought-iron will always be a material for the artist or the amateur. Quite recently, however, there has been made an important discovery which bids fair to bring about a change in the use of this metal. Wrought-iron melts at a very high temperature and it has, therefore, long been practically impossible to cast it in fine moulds; but by the addition of a small percentage of aluminium to wrought-iron when in a highly-heated condition an alloy is formed which melts at a greatly reduced temperature and gives the metal the degree of fluidity necessary to successful casting. It is claimed that the wrought-iron castings obtained in this way have all the sharpness and clearness of cast brass and at the same time retain the structural qualities of wrought-iron. So far as we can ascertain, cast wrought-iron is not in the market.

When wrought-iron has mixed with it a proportion of carbon exceeding 0.5% but not greater than 2% the structural nature of the metal is entirely changed and it becomes known as steel. So far as relates to finished hardware, steel is used only for springs and portions of detail, as the metal does not cast readily, and the surface will not keep bright. In fact, there are the same objections to it that there are to wrought-iron and almost the only use to which it is now put in hardware is in the manufacture of nails and screws and some brands of butts, which will be described later on.

When iron contains in its composition over 2% of carbon it becomes known as cast-iron, a metal which melts at a comparatively low temperature and is capable of being cast with very sharp lines. It is used a great deal for finishing work, though from its brittle nature and lack of tensile strength it is not utilized to any great extent for constructive purposes.

Iron hardware is finished in a variety of ways. If left in its natural condition as it comes from the file or hammer, it will rust very speedily, and to prevent this, the most common method is to heat the iron and paint it while hot with linseed oil, colored with lamp-black and mixed with a quantity of dryer or turpentine. When this coating is dry, the iron is sometimes roasted in a kiln — fired, as it is termed. In this manner the paint seems to be dried into the pores of the metal, and it is left with a smooth, lustreless black surface, capable of resisting the action of the weather for quite a while, though by no means rust-proof.

If, instead of the foregoing, a bath is used composed of linseed oil and gum-anime or copal, the iron, on being finally fired and polished, presents the appearance of bronze. The tones can be varied to a considerable extent by the addition of color in the shape of powdered alloys of copper and bronze, which are mixed with the oil. The "Tucker bronze," the "Berlin bronze," and the so-called "Boston finish" are all substantially of this nature. Only rarely is a thin film of bronze or composition spread on the iron by the aid of electrolysis. All of the bronze-faced iron hardware is treated with the hot-oil finish just described. The cheapest forms of iron hardware are japanned or even merely coated with ordinary black varnish, the quality of the japanning or varnish depending upon the grade of goods. Japanning is practically indestructible where the iron is not exposed to scratches or rubbing. Hinges and butts are finished in this way more than any other one form of iron hardware, though of late years the best machine lock makers have taken a great deal of care in japanning the outer casings of locks. Fine grades of pulleys are also sometimes sold with japanned frames.

Iron is galvanized by simply immersing in a bath of a melted amalgam of zinc and mercury, containing a little sodium. The iron is first cleaned with sulphuric acid, and before immersion in the bath, it is usually dusted with sal-ammoniac powder. There is not a particle of real galvanic action about the process. It is sometimes thought that the zinc and mercury form a species of alloy with the iron which prevents it from rusting. Galvanizing is, indeed, the best preservative of iron applied in the form of a wash, but the color is not sufficiently pleasing to permit of its being used for nice work.

None of the foregoing processes are especially suitable for iron, as they all effectually disguise the nature of the material. There has recently been invented a process for protecting iron from rust, which is in some respects the best thus far devised. It is known as the Bower-Barff process, a term used to indicate two processes by which the surface of the metal is converted into magnetic oxide of iron, in which condition it is absolutely rustless. In the Barff process the metal is simply subjected to the action of superheated steam. This process is peculiarly

[1] Continued from No. 657, page 39.

suitable to wrought-iron and highly finished work. In the Bower process the iron is successively subjected to the action of highly heated air and carbonic-oxide gas. The heat converts the surface of the metal first into red oxide of iron, which is finally reduced to the magnetic oxide by the action of the gas. Owing to the simplicity of the process, it is claimed that its cost is less than that of galvanizing. It may be applied to any kind or style of wrought or cast iron or steel. The surfaces so treated have a perfectly uniform blue-black color. The sharpness of the lines is not affected in the least, and when the work is polished the final color is a lustrous ebony black, such as can be obtained in no other way. This coating of magnetic oxide is so hard that it is removed with difficulty by an emery-wheel. A few of the leading dealers are beginning to keep in stock some fine grades of door hardware finished by the Bower-Barff process, but the only parties making use of the patents in the production of builder's hardware are the Yale & Towne Manufacturing Co. This concern is beginning to put in the market quite an extended line of Bower-Barff iron goods.

Iron hardware is also found in the market finished with copper-plating, the raised surface of the pattern being buffed to show the natural copper color, while the background is left black or strongly oxydized. There is quite a variety of goods in this line. Similarly ironwork is nickel-plated, being left with either plain polished surfaces or with polished raised patterns on a black ground. Both nickel and copper plating, are laid on with the aid of a dynamo.

Brass and bronze are terms which are often confounded when speaking of hardware, though the materials are quite different in composition and are usually dissimilar in appearance. Brass is an alloy of copper and zinc in varying proportions, the ratio for ordinary purposes being seven of brass to three of zinc. Brass has a light yellowish appearance, is susceptible of a high polish, and can be rendered more ductile by the admixture of a small quantity of lead, which at the same time will diminish the hardness of the alloy. Brass tarnishes very easily if handled or exposed to the weather, and is consequently generally protected by a coating of shellac, which, however, will not entirely prevent it from changing in tone. The color of the brass may be altered slightly by changing the proportions of the metals entering into the alloy, also by treating the finished castings with acids or hot chemicals in the same manner as will be described later for bronze.

Bronze is commonly an alloy of copper and tin in proportions varying from twelve parts copper to one part tin for metals to be used in the fabrication of mathematical instruments, to two parts copper and one part tin, for telescope or speculum metal. Bronze is sometimes more complex in its nature, lead being added in very slight quantity, and aluminium sometimes replacing the tin. It is less malleable but harder and more fusible than brass, and can be cast with greater ease and perfection. It is oxidized more easily than brass, and because of this it is possible to obtain a greater variety of colors for hardware goods.

Both brass and bronze can be cast with great ease, as compared with iron. The sharpness and delicacy of the casting depends, of course, entirely upon the care bestowed in preparing the pattern and the mould. There is a great difference in the quality of the work turned out by the various manufacturers. In the best of work the mould is formed with very fine sand and is double-faced, that is to say, after the pattern has been imprinted in the sand it is withdrawn, the matrix sprinkled with a still finer sand, and the mould repacked. After that, the moulds are suspended in the fumes of burning rosin, by which means they are coated with a fine layer of impalpable soot. When the molten metal is poured into the mould, the soot is pressed evenly into all the minute pores or interstices of the sand, and the resulting casting is so smooth and sharp as often to require but very little hand-chasing.

Brass goods are usually finished in the natural color of the metal with a thin coat of shellac. The same proportions of tin and copper are usually used for all the bronze work of a single firm, though the different manufacturers do not always adopt the same alloy. Bronze is, however, finished in a great variety of styles and colors, all produced essentially as follows:

The bronze on leaving the casting-room, is trimmed or chased as may be necessary, and is then immersed for a few moments in a strong acid bath which takes an almost infinitessimal film from the metal, leaving the surfaces entirely free from any oxidations or impurities. The piece of metal is then washed in weak alkali and clear water, to make it perfectly clean. Then the bronze is suspended in a bath of hot acids specially prepared with various chemicals to produce certain changes in the color of the metal. This operation is a very delicate one, requiring the care of trained workmen and a nice appreciation of the proper time to stop the action of the acids, as the appearance of the metal changes very rapidly, turning first from a bright copper red, to a pale gray and then into beautiful shades of browns and rich purples with ultimate dark tones depending upon the composition of the mixture or pickle. When the desired shade is reached the bronze is removed, dried in saw-dust, and rubbed down to an even tone on a buffing-wheel. In some designs the raised portions are buffed down until the natural color of the metal appears, the pattern showing on a ground of the darker oxidized tone. Almost any color or shade can be had with bronze by a proper treatment. The Hopkins & Dickinson Manufacturing Co. has even produced a bronze as dark as iron, and in fact quite similar in appearance. Of course ordinary hardware is simply left the natural color of the metal, when made in plain bronze. It may be said here that plain bronze is as a rule more expensive than figured work. The plain surfaces require a very even grade of metal and smoothness of casting, whereas any imperfections are hidden by patterns, and a cheaper quality of workmanship does not expose itself. In the East there seems to be a decided preference for the plain goods, while in the West the figured styles are more commonly used. When exposed to rough usage a patterned piece of hardware will in general show wear less than a plain surface.

It must be remembered that the surface finishes produced in the manner just described are not to be described as permanent. The color is in reality laid on, and is superior to paint or varnish only in that by the means of the hot pickle the color penetrates somewhat deeper than if put on with a brush. Bronze hardware is sure to change in time, no matter how it may be finished, and generally the stronger tones are the least satisfactory in the end, fading out to unpleasant musty hues. Shellac will hold the color, but as soon as it wears off, which it is sure to do on such pieces as knobs and door-handles, the exposed surfaces will turn while the shellacked spots do not. When time can be spared to keep the work polished brightly, a better plan seems to us to be to avoid everything but the natural bronze or brass color, omit the shellac, and polish by hand constantly. This, however, is seldom desirable. We have not yet reached the point where housekeepers will take as much care of the hardware as of the silver.

The treatment of silver-plated bronze is of a similar nature. The knob or plate is immersed in a silver-plating bath attached to an electric dynamo. A very few moments suffice for the deposition of the silver. The article is then taken from the bath and treated with hot acids and solutions until any desired degree of oxidation is obtained, when it is dried in saw-dust and the raised patterns slightly brightened on a buffing-wheel. There is at present a great deal of oxidized silver hardware in the market. Most of it is oxidized but slightly, leaving the raised figures a clear frosty white, but it can be had quite black if desired. The Yale & Towne Manufacturing Co., has an oxidized silver finish which is as black as old oxidized gun-metal.

Several very pleasing styles of finish are obtained by electro-plating the bronze with copper and then treating with acids. An old-copper color thus obtained is one of the most durable finishes in the market.

When the cost is not a consideration it is sometimes desirable to have gold-plated bronze hardware, especially for such things as knobs, which are exposed to constant handling. Gold-plate is no handsomer than some shades of natural bronze, but the gold will not tarnish or be influenced by the weather. Gold-plating increases the cost of bronze hardware nearly twenty fold, and being so expensive is executed only for special orders.

Nickel-plating is applied more commonly to iron or steel than to bronze. This finish is but little used for nice work as the nickel will tarnish by exposure to the atmosphere after which no amount of rubbing will restore its first appearance. Nickel-plating is best adapted for keys, springs, etc.

The following list will give an idea of the great variety of possible treatments of bronze hardware.

FINISHES FOR BRONZE HARDWARE.

I. *The Hopkins & Dickinson M'f'g Co., finish:* —

A. Statuary. Dark background, light surface.
B. Statuary. Medium dark background and surface.

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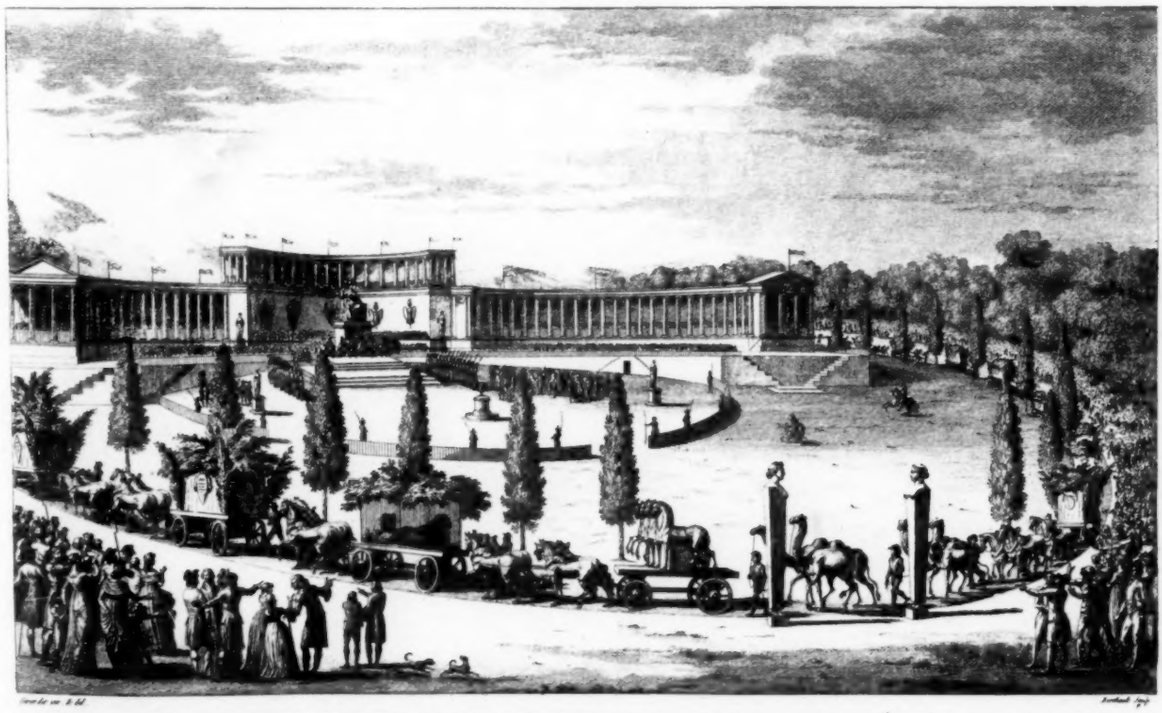
ÉLÉVATION GÉOMÉTRALE
côté du louvre.



ENTREE TRIOMPHALE DES MONUMENTS DES SCIENCES ET ARTS EN FRANCE ; FÊTE À CE SUJET.
les 9 et 10 Thermidor An 6me de la République.

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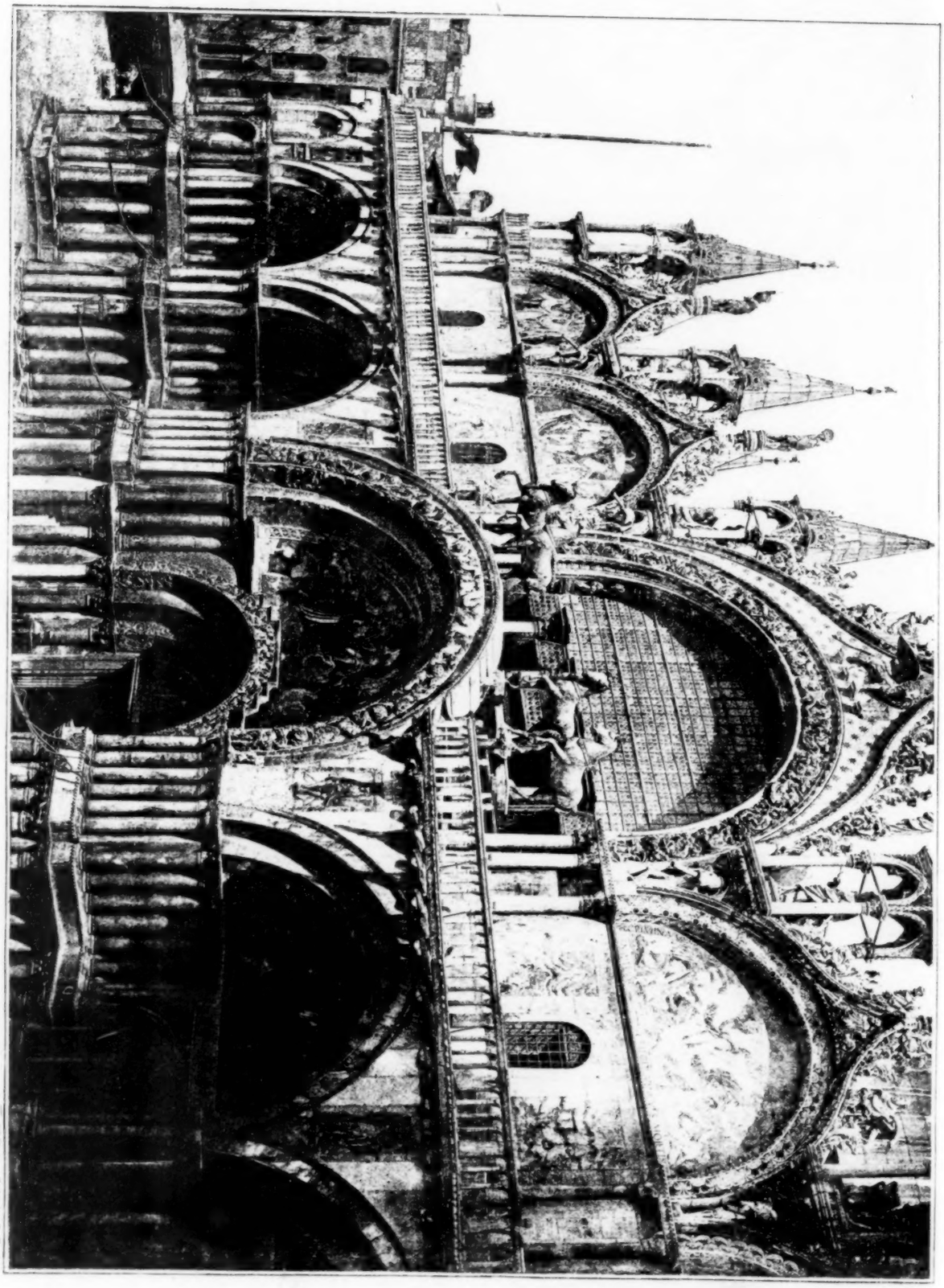

The Portico of St. Mark's, Venice.

Heliotype Printing Co. Boston.

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The old "BROOKS HOUSE". West Medford: Mass:

Heliotype Printing Co. Boston.

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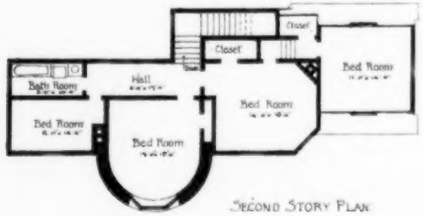
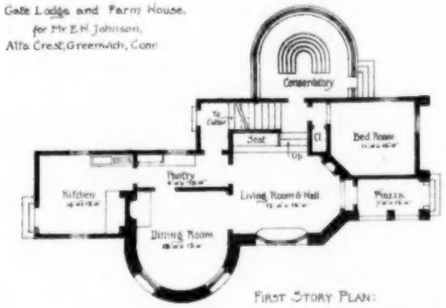


Second Story Plan

Gate Lodge and Farm House.
for Mr E.H. Johnson,
Alta Crest, Greenwich, Conn



First Story Plan.

Carrère and Hastings, Architects,
3 Bowling Green, N.Y.

Thomas Hastings del.

Carrère & Hastings Archts

Heliotype Printing Co. Boston

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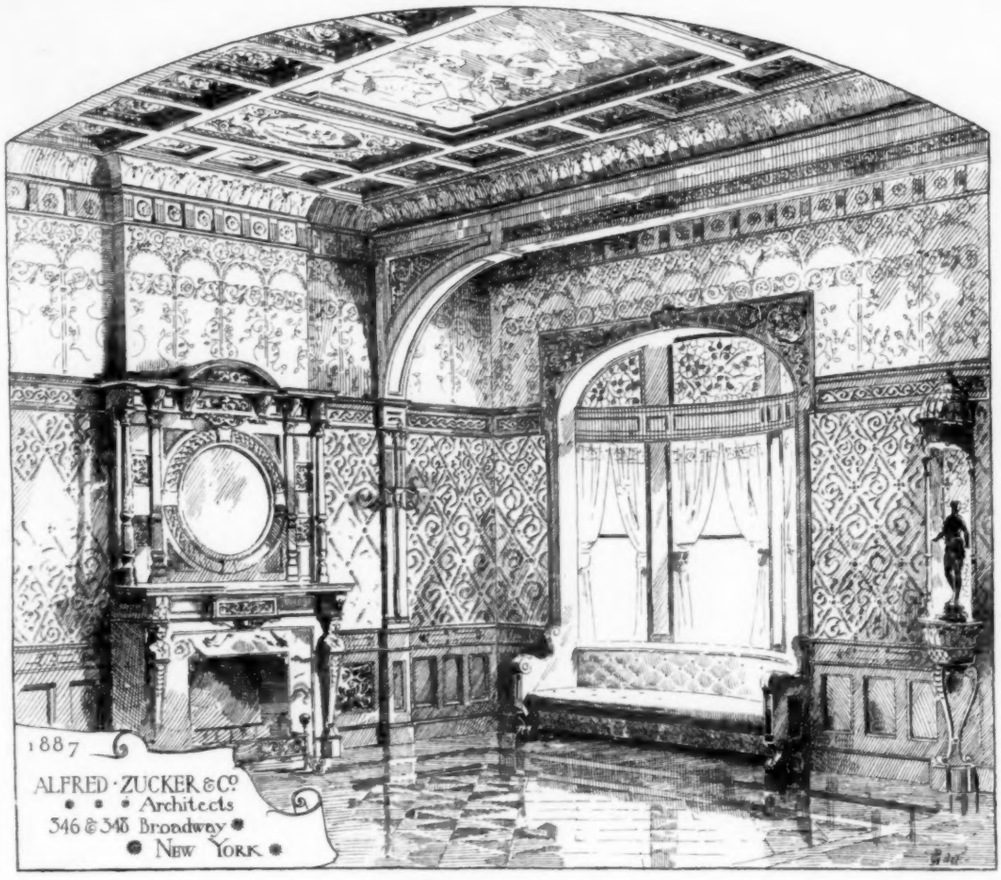


RECEPTION · ROOM ·

Heliotype Printing Co. Boston.

DINING · ROOM · in · House · of · L · M · HORNTHAL · № 6 · E · 78th · St · NEW · YORK

COPYRIGHT 1888 BY TICKNOR & CO

House of J. S. Bell, Denver, Col.

Andrews & Jaques
Architects
Boston Mass.

Heliotype Printing Co. Boston.

E. Ebony. Suitable only for Plain or Lined Design.
F. Statuary. Matted with Green.
G. Gilt or Gold-washed.
H. Gold-plated.
I. Gold-plated. Matted with Enamel, in all colors.
K. Gold-plated. Matted with Silver.
L. Silver-plated.
M. Silver-plated. Matted with Gold.
N. Nickel-plated.
O. Nickel-plated. Matted with Enamel.
P. Nickel-plated. Matted with Gold.
R. Nickel-plated. Matted with Copper.
S. Hand-plated. Silver, suitable only for perfectly plain patterns.

II. *P. & F. Corbin, finish:* —

No. 1. Natural Color, Light Bronze.
No. 2. Chemical Dark Brown or Statuary Bronze.
No. 3. Natural Color on Surface and Black Background.
No. 3½. Same as No. 3 Finish, with different arrangement of colors.
No. 4. Natural Color on Surface and Dark Brown Background.
No. 5. Nickel-plated.
No. 7. Nickel-plated Surface with Gold-plated Background.
No. 8. Gold-plated.
No. 10. High Polish, Natural Color.
No. 15. Sage Green Background and Natural Color on Surface.
No. 16. Terra-cotta Backgro und and Natural Color on Surface.
No. 17. Steel Gray Background and Natural Color on Surface.
No. 18. Japanese Finish.
No. 19. Oxidized-silver Finish.
No. 20. Old Brass Finish.
No. 21. Oxidized-Iron Finish.
No. 22. Antique-Copper Finish.

III. *The Ireland M'f'g Co., finish:* —

No. 1. Light Bronze.
No. 2. Light Brown.
No. 3. Black Background, Polished Surface.
No. 4. Brown Background, Polished Surface.
No. 5. Nickel-plated Surface and Background.
No. 15. Sage Green Background, Polished Surface.
No. 16. Terra-cotta Background, Polished Surface.
No. 17. Steel Gray Background, Polished Surface.
No. 19. Oxidized-silver.
No. 21. Iron Finish all over.

IV. *Nimick & Brittan, finish:* —

No. 1. Bright Surface, Natural Color.
No. 2. Dark Brown Surface and Background.
No. 3. Bright Surface and Black Background.
No. 4. Bright Surface and Brown Background.
No. 5. Bright Surface and Terra-Cotta Background.
No. 6. Bright Surface and Green Background.
No. 7. Nickel-plated Surface and Background.
No. 8. Nickel-plated Surface and Black Background.
No. 12. Gold-plated.
No. 13. Steel Gray Bronze.
No. 14. Old Gold Bronze.
No. 15. Oxidized-silver Surface and Background.

V. *Nashua Lock Co., finish:* —

No. 1. Natural Color, Light Bronze, Polished Surface.
No. 2. Dark Bronze.
No. 3. Light Bronze, Polished Surface, with Black Background.
No. 4. Light Bronze, Polished Surface, with Brown Background.
No. 5. Nickel-plated, Plain Surface.
No. 6. Nickel-plated Surface, with Black Background.
No. 15. Hand Finish.

Besides the finished work, both brass and bronze are used for screws, springs, lock-fittings, etc. A few locks are made with cases of cast-brass and some manufacturers are preparing to use copper-plated iron ore for the same purpose.

Brass and bronze together are used more than any other one metal for builders' hardware and are the basis of nearly all door and window fittings.

An important addition to the list of metals available for hardware purposes has recently been made in the shape of a composition designated as Phosphor-Bronze, an alloy of which the constituent parts are not as yet made public, but which the patentees describe as being a phosphorized alloy of copper and tin. The chemical action of phosphorous on the metals composing the alloys is claimed to be two-fold; on the one hand it reduced any oxides dissolved therein, and on the other it forms with the purified metals a most homogenous and regular combination, the hardness, strength, and toughness of which are completely under control. No other metal combines, in so high a degree as phosphor-bronze, the conditions of toughness, rigidity, hardness and great elastic resistance. Thus far phosphor-bronze has been used in the hardware trade only for screws and for lock-springs. In cities wherein soft coal is used, it has been found that brass springs soon lose their elasticity, owing to the action of free sulphuric acid in the air. Careful tests have shown that phosphor-bronze offers twice as much resistance to corrosion by acid as copper. Further experiments have been made, extending over a period of ten months, to determine its durability, when exposed to the weather, as compared with the best brass wire. After lying on the damp ground for that length of time the brass was found to be quite brittle and worthless, while the phosphor-bronze, under exactly similar conditions was practically unchanged. It will be readily seen then how valuable a metal this is. Unfortunately its degree of elasticity is less than that of brass, and the springs required for a lock when of phosphor-bronze are sometimes so large as to be impracticable. It is, however, by all odds the best material for springs and is used by the Hopkins & Dickinson Manufacturing Co. in their best grades of locks.

Aluminium has recently appeared as a possible substitute for bronze. It is a metal not unlike lead or platinum in appearance, but is very light, having a specific gravity of 2.56, equal to about one-third that of steel and one-fourth that of silver.

It is very strong, will not tarnish, and is almost indestructible. It melts at a comparatively low temperature and can be cast with sharp lines. Copper, brass, and bronze are improved in strength, color, and durability by the addition of ten per cent of aluminium. It is, however, a metal of the future and is not yet in the hardware market.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF JOHN E. THAYER, ESQ., LANCASTER, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

THE ARCH OF THE PLACE DU CARROUSEL, PARIS, FRANCE. M. PERCIER, ARCHITECT.

SEE article on "Equestrian Monuments," elsewhere in this issue.

THE HORSES OF ST. MARK'S, DEFILING ON THE CHAMP DE MARS, PARIS, FRANCE.

SEE article on "Equestrian Monuments."

THE PORTICO OF ST. MARK'S, VENICE, ITALY.

THIS view which is reproduced from a very excellent print in the *Builder* shows the bronze horses from an unusually favorable point of view.

SKETCHES FROM THE OLD BROOKS HOUSE, MEDFORD, MASS.

GATE-LODGE FOR E. H. JOHNSON, ESQ., ALTA CREST, GREENWICH, CONN. MESSRS. CARRERE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

THIS lodge, or farmer's cottage, which is built of pasture-stone and wood, will cost, including heating apparatus and plumbing, $4,800.

HOUSE FOR J. S. BETTS, ESQ., DENVER, COLO. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

DINING-ROOM AND RECEPTION-ROOM IN HOUSE OF L. M. HORNTHAL, ESQ., NEW YORK, N. Y. MESSRS. A. ZUCKER & CO., ARCHITECTS, NEW YORK, N. Y.

MILAN CATHEDRAL. — Apropos of the final architectural competition for the Cathedral of Milan, Mr. Paul Cesa Bianchi, the architect of the Cathedral, has been delivering an address at Milan on the origin of the Cathedral. As to the much disputed question of the active part taken in its building by Jean Galeas Visconti, Count of Vertu, Mr. Bianchi declared himself a strong partisan of Visconti, and devoted the first part of his address to the consideration of the foreign influences to which the great monument had been subjected. In the second part the lecturer spoke of the native and brought out in a most interesting way the influence of Tuscan art in the work. As in the first part he attached particular importance to the personality of Antoine de Saluce, the archbishop who was prominent for the part he took in the development of the construction of the monument, so in the second he emphasized that of John of Milan, who worked on the Cathedral after having been the pupil and friend of Gaddi at Florence, and having there executed some remarkable works. An Italian writer on art, Alfredo Melani, in a recent correspondence thinks that the Tuscan influence so highly praised by Mr. Bianchi should not be allowed to count for too much. He also points out the impossibility of the identity of André degli Organi, the actual author of the Cathedral, or the person who first proposed its construction and elaborated his idea, with the celebrated Florentine architect, Andrea Orcagna, a nidentity that Mr. Bianchi undertook to prove. The mere fact that Orcagna died in 1308, and that the work of building the Cathedral of Milan was only commenced twenty years later, is sufficient to show that Mr. Bianchi allowed his enthusiasm for Tuscan art to carry him too far. "However that may be," says Mr. Melani, "it is to be hoped that the address may be published, for the resources it contains widen the field in which up to this time have been concentrated the labors of all those interested in the cathedral."

ANCIENT AND MODERN LIGHT-HOUSES.[1]—XXII.

PIER-HEAD LIGHTS.

On the great lakes most of the harbors are improved by building two parallel piers of cribwork filled with stone out into the lake until these piers reach a certain depth of water; the relief afforded by them is but temporary and they have to be extended from time to time.

The end of one pier is marked by a small light of the fourth or fifth order, supported on a frame structure either square or polygonal. In the tower there is room for the spare lamps, supply of oil, etc., and a place for the keeper to sleep. When the pier is extended these towers can be readily moved out to the end. The story that they are so light that a schooner ran her bowspirit through one and carried it from Grand Haven to Chicago is current but not trustworthy.

When the pier is entirely completed, the practice is to build a separate foundation and to place on it a conical cast-iron tower similar to the one at the entrance to Portsmouth Harbor, N. H.

Quite a pretty light of the kind, but modelled after a small Roman temple, is on the end of the Portland, Maine, Breakwater.

RIVER-LIGHTS.

The total number of lighted aids to navigation in the United States on the 1st of July, 1887, including light-ships and lighted buoys was 2034, of these 1232 are what is known as river-lights.

Congress has specially authorized the following rivers to be lighted: Hudson and East Rivers, N. Y.; Delaware River between Philadelphia, Pa., and Bordentown, N. J.; Elk River, Md.; Cape Fear River, N. C.; Savannah River, Ga.; St. John's River, Fla.; Mouth of Red River, La.; Chicot Pass and navigable channel along Grand Lake, La.; Mississippi, Missouri, Ohio, Tennessee and Great Kanawha Rivers; Columbia and Willamette Rivers, Oregon; and Puget Sound, Washington Territory.

The rear beacon
Edenton Range
N. C

A river-light is an exceedingly simple affair, consisting of a pole or mast with an arm or a shelf at its top by which to support a lantern. These are generally placed on the shore, but sometimes the light is needed in mid-stream in which case a small crib filled with stone forms a base for the pole. Or, sometimes, an iron spindle is inserted in the rock as is the case in several places on the East River, N. Y.

The lanterns in general use are known as tubular lens lanterns, they are not liable to be blown out and will burn all night.

There are many places difficult and dangerous of access in stormy weather where small lights would be of great value could they be constantly maintained, this has been accomplished by a simple addition to the lens lantern of a reservoir containing a gallon of oil, which is automatically fed to the lamp on the principle of the German student-lamp. By this device the lamp will burn and give a good light for at least eight days and nights without attention and during this time there is almost sure to be weather calm enough for the keeper to attend to the light. This improvement was made at the Light-House Depot at Staten Island; it is of recent date and already promises to extend the use of the stake-lights to places where formerly it was thought necessary to establish regular light-houses.

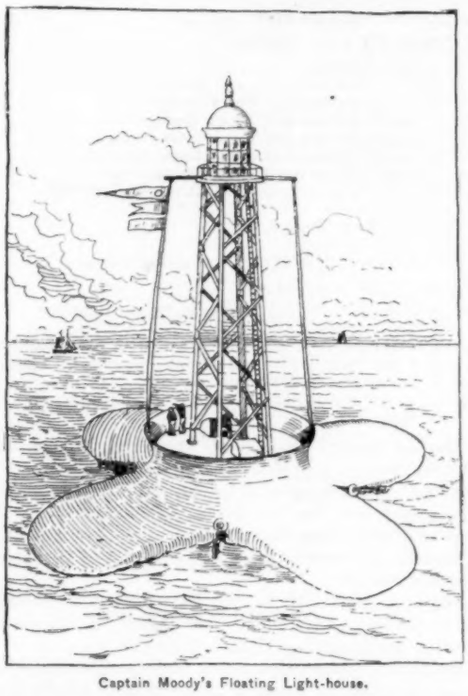
One of the simplest towers in the Light-House service existed for many years at Edenton, N. C. As the sketch shows it was a tree, whose branches supported a box for the lantern and a platform reached by a ladder.

I regret to say that this picturesque structure perished through old age and was replaced by a prosaic pole to the top of which the lantern was nightly hauled by a rope.

As soon as the energetic citizens of the neighborhood discovered that the light-keeper was no longer condemned to the exertion of climbing a ladder night and morning, the Light-House Board received a number of applications for his position.

FLOATING-LIGHTS.

Floating-lights are of two kinds, light-ships and lighted-buoys. The former are very strongly built schooners, which show during the day a colored disk from each mast to distinguish them from ordinary vessels, while at night powerful lights are hoisted to their tops:



Captain Moody's Floating Light-house.

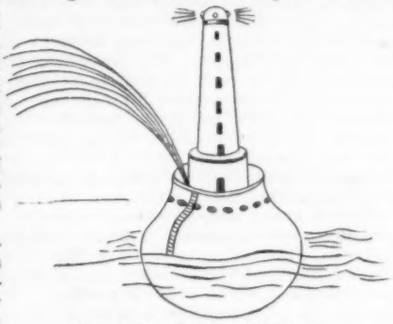
these lights consist of eight or nine lamps with reflectors hung on gimbals so that their rays will be projected horizontally. They are arranged in a circle and enclosed in a lantern; during the day the whole apparatus is lowered to the deck into a small house at the foot of each mast. Light-vessels are also provided with a fog-bell and sometimes with a fog-whistle operated by steam; they are stationed on outlying shoals where it is difficult if not impossible to erect light-houses. There are twenty-three of these light-vessels in position on the Atlantic Coast and one on Lake St. Clair: there are none on the Pacific Coast.

As light-ships are occasionally driven from their moorings by severe storms or may in some way be disabled, relief light-ships are kept in readiness to replace them until they can be returned to their stations.

Lighted buoys are comparatively of recent invention, they consist of a buoy filled with compressed illuminating gas; on the top of the buoy is a gas-jet in a lens, the latter is so arranged that neither wind

[1] Continued from No. 646, page 221.

nor wave can extinguish the light, while an ingenious governor determines a constant flow of gas to the burner irrespective of the pressure in the buoy. When lighted they will burn for a long time without attention, generally about three months, though this length of time may be altered by changing the size of the buoy and the pressure to which the gas is subjected.



Capt. Harris's Floating Light-house.

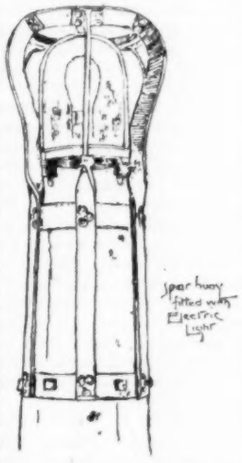
This system of lighting by compressed gas is, of course, also applicable to stationary lights and is used in the beacons in Currituck Sound, N. C., and also on the Romer Shoal, New York Harbor. Another kind of lighted buoy has just passed successfully its experimental stage and is now being actively pushed to completion as a practical aid to mariners. It is the joint invention of Lt. Comdr. M. R. S. Mackenzie, U. S. N., and Lieut. John Millis, Corps of Engineers, U. S. A., and in general terms consists of a spar-buoy supporting an incandescent electric-light connected to a dynamo-machine on shore by an armored cable.

Foster's Gas-lighted Buoy.

The incandescent lamp is enclosed in a cylinder of stout glass to protect it from the waves, and this cylinder is further protected against the shocks of ice or other floating bodies by a kind of cage of steel bars.

Six of these buoys, three on each side, will be set to mark Gedney's Channel, New York Bay: the house containing the engine, boiler and dynamos will be located at Sandy Hook; the whole work is now under contract and will probably be in operation by the fall.

It has been frequently suggested that, that portion of the Atlantic Ocean most frequented by vessels should be lighted by a series of floating light-houses. At our Centennial Exhibition at Philadelphia several drawings and paintings were shown exhibiting the methods by means of which it was proposed to accomplish this object.



The following are some of the advantages claimed by the inventors: the light-houses could be anchored anywhere on the high seas and both guide and light vessels to their destination (one inventor showed his light-houses strung across the ocean like street-lamps in a city); they could be used as post-offices, telegraph, signal and life-saving stations. Pilots would await on them the arrivals of vessels; in stormy weather ships could moor to them and outride the gale. Captain Harris's painting, quite a large one, showed three floating light-houses and several vessels in a violent storm, the latter are much tossed but the light-houses are steady and are assisting the vessels by firing rockets and throwing life-lines from mortars. The supports of the light-houses are apparently can-buoys of large size. Captain John Moody's float is also of wrought-iron and shows considerable originality. It has four immense rays or arms, these being intended primarily to steady it and could also be used for storage purposes; the Captain claims that its peculiar form allows it to be boarded at any time and in any weather and that in time of war it could be used as a fort.

It is needless to say that none of these projects have been put into effect, perhaps the reason may be found in a remark by one of the inventors: "The undertaking is certainly great, and to carry it out in a series of vessels across the Atlantic would cost a great sum of money."

FINDING WATER BY THE DIVINING-ROD.

WITH reference to the paper on "Modern Divinations," which appeared in this *Journal* (February 18, 1888), we have received the following communications:

You may perhaps be surprised to hear that there are numbers of intelligent readers of your *Journal* that believe implicitly in the "dowsing rod" for finding water, and that those readers include noblemen, gentlemen, parsons, bishops, officers of the army, engineers, magistrates and others. The chief "water-wizards" at present are John Mullens and Lawrence; and the first can, I know, furnish a volume of testimonials to his powers from parties such as I have named. John Mullens has operated in very many places in England, and as far north as Dundee and other places in Scotland. He belongs to the same county as Lawrence, is a working mason on a gentleman's estate, and an unpretending honest man, who, if desired, sinks and builds his own wells, and charges nothing if the water is not found. He prefers to be employed after long droughts, as water found then, he reasonably concludes, will generally be from a permanent source. In wet seasons, he says, "there is water everywhere," and the good springs are consequently worse to find. He has been employed here several times to find water, after much expense had been incurred with engineers and others, and has always been successful, although at first most of us doubted his powers. I have tested him in every possible way, and he has never failed. No one now hereabouts doubts his powers. The vicar was perhaps the most incredulous until he had tested the man thoroughly, what convinced

him most being that when Mullens was asked to find water in his flower garden, he set out accurately the running sewer from the house for a long distance — not a trace of which was discernible above ground, and which no one knew but the vicar. He did other work of the same kind at the mansion here, finding an old disused sewer, the existence of which was suspected, but, although searched for could not be found.

He has been employed, I believe, on similar duties by the London authorities. He discovered our water-mains and branches here wherever he crossed them in the course of his journeys, greatly to the surprise of an engineer from Sheffield who constructed our reservoirs, and who followed John "afar off" for several days. The same engineer afterwards confessed to the writer that he was puzzled; but he admitted the man's powers. Mullens used the hazel and thorn "twig" only. No member of his family has the "gift," hence everything has to be done by himself. He asks no assistance save a "twig," cut close by, and a lad to follow behind and put a peg in where he makes a mark with his heel. He charges his fare and a modest fee, and is willing to submit to any reasonable test. He does not profess to explain his power, knows little or nothing about science, and is rather illiterate. Not a few large breweries and manufactories owe their water-supply to him. He does not profess to find still water; it must be *running*. In the case of the water-mains here, the "twig" turned up above the pipe in fields, woods, and

highways where no signs of the ground having been disturbed appeared, the pipes having been long down, and no one knowing anything about their whereabouts but the waterman, and he depends on the map when he seeks them.

I do not attribute the man's gift to anything supernatural, but to natural causes not yet understood. That water can be found by the man in the way described, I have no doubt whatever; and I am equally sure he will confound any sceptic who tries him. Mullens says a "twig" from a variety of trees will do, but the hawthorn and hazel are the most active; and the way the point whirls round in a moment above water is marvellous. The "twig" is Y-shaped; and the man, holding a leg firmly in each hand and the point downwards, steps slowly forward, stooping. On one occasion I held one end of the "twig," where it projected through his hand, the vicar holding the other end, both firmly, Mullens simply holding it, but without the power to move it up or down, yet it whirled round as before, except where we held it, and consequently *twisted* the bark into wrinkles by the force it exercised.

Another correspondent writes: My attention having been drawn to your article upon the use of the divining-rod in finding water, I beg to give you my experience upon the matter. About four years ago I was invited by a land-agent in a neighboring parish to meet him and a man whom he had sent for from the neighborhood of Bristol, who, he stated could find water with a divining-rod. At first I decided I would not go on such a wild-goose chase, as I thought it would turn out; but afterwards I changed my mind and went to meet them. The rod consisted of a small branch of white thorn about eighteen inches long in the shape of the letter Y. When the man — who was a mason — tried to find water, he walked slowly over the ground clasping the rod firmly with both hands near to the forked branches; and when the branches moved upwards he said there was a spring of water below, and gave his opinion as to the depth of it from the surface. I was sceptical about the rod, and thought he moved it by some sleight-of-hand; but in the course of the day I was convinced it was not so. We afterwards came to a small stream of water by the side of a road caused by a heavy shower of rain. I asked the man to test it. I took hold of the rod as well as himself, in order to prevent the stick from twisting about; but in crossing the water I could not stop it doing so. I then held it with a pair of pincers, which had the desired effect as regarded that portion of the rod, but not so with the forked branches; in twisting upwards, each branch was split in the middle of them.

I engaged the mason to look over an estate of which I had the management, and some portion of which was short of water. I took him to some deep wells of which I knew the depth. He was able to tell me the depth within a few feet. We next proceeded to a farmyard where there was a short supply of water, and where I wished to sink a well. He fixed upon a place, and said there was water about sixty feet from the surface. This proved to be correct, afterwards, I had a well sunk, and found a tolerable supply of water.

He was taken to two other parts of the estate where I was anxious to get a supply of water; but he could not find any there. I afterwards tested him with places where I knew there was water, first at a small spinney, when he immediately said: "There is a large supply of water here and bubbling near the surface." This was the case. A spring about fifty yards off, and which he could not see, as the trees intercepted his view, supplied this village with a constant supply of water. Afterwards we came to a field where water was conveyed by a drainage-pipe from a fish-pond to the kitchen-gardens. When the man crossed the field where the drainpipe was laid, the rod immediately twisted about. Lastly, he was taken to another pipe which was laid under the highway to convey water from a pump in the wood-yard to the stables. When he crossed it the rod twisted up. — *Chambers's Journal.*

BOOKS AND PAPERS.

IT is not an easy thing to make a dictionary or an encyclopædia, but it is always an interesting thing, especially when this dictionary or encyclopædia touches on questions relating to the arts. In this connection I have already drawn attention to the "*Dictionary of Furniture*," of which the second volume has just appeared, and which is very valuable for artists and literary men. It is a pleasure to turn over the leaves of such a work, to stop at a word taken at hazard and there discover its real meaning, learn its history, and study its different applications. It is very rarely that in the midst of things already known we do not discover one meaning of which we were ignorant, an original explanation which clears away a mysterious and inexplicable point, and from deduction to deduction makes us understand the genealogy of a word, and its rôle in the history of arts and literature.

Viollet-le-Duc has left a valuable monument of this kind in his "*Dictionary of French Architecture*," from the eleventh to the sixteenth century, and his "*Dictionary of Furniture*" remains and will remain for long the most precious document upon this epoch; but unfortunately these documents stopped at the sixteenth century, which is some distance away from our day. Moreover, Viollet-le-Duc always adopted a point of view peculiar to himself and essentially national. As to everything that relates to the Middle Ages in France, his dictionary will remain the most precious and the most complete; but it is evident that the ages that followed and contemporary time are also very interesting to study, and offer the modern architect much of inspiration. Moreover, however rich in monuments France may be, there are many other countries where architecture and the science of construction have given rise to original formulas which the architect should understand. Hence the need for a long time felt, of an encyclopædia or a dictionary which should continue Viollet-le-Duc's and complete it. Artists and students have already attempted to fill this vacancy in part, but up to the present time the new dictionaries, although presenting much of interest, indeed, did not wholly answer to the needs of the occasion.

M. Paul Planat, director of the journal *La Construction Moderne*, has just published the first volume of an encyclopædia of architecture and construction, which is worthy of being seriously recommended. It is a valuable work to consult, and a curious one to read. The words or heads will not be too numerous; but all those which are treated will be handled in a complete and intelligent fashion and in a very interesting form for the architect. Understanding the enormous difficulties of such a work, M. Paul Planat has, naturally enough, surrounded himself with collaborators, requiring each one of them to treat those subjects which each had already digested. "Some of them have consented to prepare abstracts of their archæological studies into the origin and the ancient transformations of architecture. Others have traced the picture of the phases which art has passed through in modern nations. Others have reduced to brief and substantial articles the rules of practical construction and the laws of building, etc." This method is evidently an excellent one and should give a series of exact results. But these documents must be studied with care. Verbosity must be suppressed, and when it is a question of a special dictionary, such as a dictionary of architecture, care must be taken to pass over articles which are foreign to construction, or at least which have with it only a secondary connection. It is evidently easy to prove that mechanics, metallurgy, chemistry, geology, and even physics, are interesting to know in matters of construction, and that the application of these different sciences may be encountered in many cases. "A notion, at least elementary and practical, of these sciences will make henceforth an integral part of the training imposed on architects," says M. Planat very properly. Still, in the list of subjects treated, too great departure must not be made from those acquirements which an architect should possess which relate to architecture or construction properly so called. The laws of acoustics it is certainly a benefit to know in many cases, as in the construction of a theatre, a concert-hall, or lecture-hall, but then, it is likely that the architect entrusted with work of this kind will consult technical works, where he will find in detail the rules and explanations of which he has need. It is not to a dictionary or even to an encyclopædia of architecture that he will go when making his researches; it is rather to books on physics that he will apply. In the same way if he seek precise information concerning metallurgy and the making of steel, for example, he will seek his information in scientific works. This is a point on which we may complain of M. Planat, in that he has given too great importance to certain articles of this kind, not that they are absolutely useless and devoid of interest, far from that; but it is fair to ask one's self whether they are properly in place and whether they are not treated at too great length for an encyclopædia of architecture. Perhaps, M. Planat has been brought within the reach of a criticism, also, — which is perhaps personal to me and may not be shared by other people — by the method adopted by him in editing the articles. These articles are signed. This may have certain advantages and among others — and this ought to be the most serious — that of giving more authority to such and such interpretation of which an author known and accepted as an authority takes in some degree the responsibility; but this method may also have certain ill effects which have their base in the *amour propre* of the author of an article. A writer before being known would evidently make himself of as much importance and use as possible, but his signature is an engagement of his dignity not to give incomplete or too brief information, or such that its modest tone would have the air of ignorance; consequently he will be less disposed to allow the editor to revise and correct and cut down his article, and the editor will have greater fear of wounding the writer's self-love.

The list of collaborators on the encyclopædia is published at the head of the first volume, where we see the names of MM. André, Member of the Institute, Baudot, Boitte, Corroyer, Daumet, Durand-Claye, Gaudet, Guillaume, Hermant, Laisné, Pascal, Sédille, etc. These names would give sufficient evidence of the serious and exact character of the work. The editor could perhaps, through the suppression of the signature at the end of each article, have reserved for himself more liberty in the exercise of his privileges as editor of the encyclopædia. This is only a slight criticism and may be disputed. Without insisting further, it is better to examine the quality of M. Planat's new work. What will certainly make the book a success is the large part devoted to the study of foreign architecture. German and English architecture occupy in the first volume a very important place, and are treated in a particularly interesting manner. The well-considered text is illustrated by many cuts. This is a most important point — an illustration is the document *par excellence* for

an architect, who has need to see but less need to read. The article on Germany is illustrated by twenty-four full-page plates and a greater number of cuts interspersed in the text, or which even occupy a full-page; that is to say, the subject is treated as completely as possible in a simple encyclopædia. The different specimens of German architecture, ably presented and judiciously chosen from the different styles, give varied information concerning the structures of that country. Among the most curious may be mentioned the Hôtel de Ville of Schwalenberg, at the end of the fifteenth century, where the timber-work is treated in a peculiar fashion. Also the wooden houses at Hoxter and Hildesheim. Wooden architecture is not the only interesting feature, and we find several characteristic structures in stone, such as the Gewandhaus at Brunswick, an elaborate structure of the year 1590; and the porch of the Hôtel de Ville at Halberstadt, added in 1663 to a Gothic building. This porch is rich in admirable sculpture, and is very elegant in composition. German Renaissance work is really very interesting to study. The art of decoration is carried to a great length, especially in northern Germany, where we discover a characteristic trait; there the decoration consists in covering the surface of the stone with little geometrical ornaments of free design, the ornaments sometimes covering the whole surface of a building as with tapestry: the doorway of the Château of Mersebourg is a curious example. In other places they only decorate the alternate courses, or accentuate certain parts, such as pilasters, string-courses, keys, etc.

Finally, in this article is to be found rapidly sketched "a picture of a school of architecture which has doubtless received inspirations from foreign sources, but which none the less has preserved a character and originality peculiar to it. Less sober, less pure, perhaps, than the French Renaissance, the German Renaissance of the North or the South, by its original fecundity deserves to be better known in France than it is up to the present time." These last lines of the article by MM. Lambert and Stahl resume in a few words the interest of these studies of foreign architecture, now-a-days too much neglected — studies which will make the success of M. Planat's work.

The "*Encyclopédie Nouvelle*" includes, also, biographical notices, studies on the great châteaux of France, etc. The complete work will be contained in six large volumes of two parts each, and will be about a third larger than the dictionary of Viollet-le-Duc. The subscription price will be three hundred francs. M. Planat, together with the publication of this encyclopædia, carries on the publication of the volumes which will form the "*Bibliothèque de la Construction Moderne*," which will contain a series of more practical works and treating of professional matters such as apply to mechanics, and others more specially devoted to architecture as an art. In this second list belongs "*Les Habitations Particulières*," of which the first two parts have just appeared. "Our times, tormented by the remembrance of too many examples which the past has left to us, and which belong to the most varying styles, is making the greatest efforts to devise a style of its own. It is in our public buildings that we can note the happiest successes. Without doubt we discover in them evidence of research, study, and care, a purer and more refined taste than would have been the case thirty years ago; but there were not then customs and new needs which call for peculiar arrangements fitted by consequence to excite a transformation in architecture. But during twenty years there has been developed with the growth of public prosperity kinds of constructions which have not their analogies in the past. Unquestionably there were in the last century vast *hôtels* occupied by the aristocracy and the wealthy, but the customs of display and pomp have nothing in common with our modern ways." With us comfort and hygienic convenience are all-important. Baths, boudoirs, toilet-chambers, are arranged with a perfection entirely unknown formerly. It is in these numberless *hôtels* of every style and all sizes that our age will leave the most distinct mark of its inventive spirit as well as of its fecundity. The interest in this publication it is easy to comprehend; but M. Planat must once more be praised for not limiting himself to the study of French architecture alone. He adds to the engravings colored plates, text filled with sketches and initial-cuts, when he passes in review the private architecture of foreign lands. This is both new and interesting. We can here compare the styles of England, Germany and the United States, which are so charming in their originality; and I am happy to mention that many of the illustrations are borrowed from the *American Architect*. The "*Hôtels Privès*" includes besides the cuts in the text, eighty full-page colored plates, reproduced by a new process, under the form of architectural *rendus*.

COMMUNICATIONS

OFFICE-HOURS.

BOSTON, MASS., August 4, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—About eighteen months ago I received a card (printed) which I infer came from some society of architects, stating the hours agreed upon for opening and closing the office, and the hours are the following: Open at half-past eight A. M., close at half-past five P. M., one hour out for dinner. Will you kindly inform me through your columns if any other architects received such a statement or card, and by what committee of architects such notice was authorized to be sent. I am, dear sir,

Yours respectfully, C. J. BATEMAN, *Architect.*

[WE have not seen any such card and can only say that no movement of the kind has been made by the Boston Society of Architects. The length of the draughtsman's working day is regulated by local custom to some extent, but each office is free to establish its own rules. In Boston, the office hours usually observed are from 9 to 5 o'clock, with "an hour out for dinner."—EDS. AMERICAN ARCHITECT]

A CORRECTION.

WATERTOWN ARSENAL, MASS., August 8, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In the article "On the Hygrometric Behavior of Certain Woods," the words, "Notwithstanding there was a shower of rain in the meantime," belong to the paragraph preceding that in which they appear. No. 658, Page 51.

Yours respectfully, JAMES E. HOWARD.

NOTES AND CLIPPINGS

THE MONASTERY GARDENS OF ROME.—Next to the wilderness of the ruins, I love the little monastery gardens laid out by contemplative monks. These spots are now nearly all government property. In some cases a few old friars are left as care-takers; and with a half-melancholy air, as if bearing about the consciousness that their day and generation is nearly done, they show the chapels and old gardens, opening even refectories, cells and other sacred places to women, formerly closed from the profane foot of the sex. One of the most beautiful of the old cloister gardens is attached to the sumptuous church of St. Paul's outside the walls. You go to St. Paul's, now, by train from the Piazza Montanara, and after inspecting the new edifice, so grandiose and cold, with its splendid nave upborne by triple rows of marble columns, its marble pavement reflecting the brand-new frescos like polished glass, after you have looked at the 12th-century mosaics that were saved out of the fire which destroyed the old church, it is a relief to get into the cloister, adorned with the delicate caprices of its fairy-like twisted columns and fine inlayings. The whole garden is filled with roses and sweet herbs. In the middle stand the old well and the sun-dial, but everywhere the pink buds and blossoms are turned toward the sun. The mid-day warmth brought the odors of lavender, rosemary and mint,—scents all the brotherhoods seem to love by instinct. Such depths upon depths of peace and quietude filled this monkish rose garden, I felt I could sit there for hours and muse on a skull, without getting too strong an odor of our mortality. For the glorious Italian spring triumphed over death and decay. I must confess to much sympathy for that side of monastic life that runs to such inclosed bits of beauty, full of clarified sunshine, sweet scents and lovely bloom. The prettiest monastic garden I have seen in Rome adjoins the church of San Pietro in Vincoli, where the "Moses" of Michael Angelo and the "Saint Margaret" of Guercino are to be seen. After you have sat a long time before the august figure of the Hebrew law-giver, with the feeling of the old Greeks for their Jove of the Olympian Temple,—that he might rise at any moment and rend the roof,—it is a pleasure to stroll out into this garden. The monastery is now turned into a school for engineers; but the polite attendant is always ready to open the glass door, and let you into a grassy nook planted with tall old orange trees, covered with the golden fruit, into which the banksia rose has clambered with a perfect tempest of blossoms, while spring flowers and blooming shrubs fill it to overflowing, run riot over the paths and paint themselves in vast nosegays against the dark green and golden background. A pair of rooks were fluttering in the shrubbery, the first I had seen, and bright-green lizards slipped away between the stones of the old wall. The silence and freshness were indescribable; and, as usual, the vanished brotherhood had left a savor of sweet, old-fashioned herbs behind them. —*Augusta Larned, in the Christian Register.*

KEELY AS A TUNNEL-BORER.—As a specimen of mid-summer madness we can recommend the following extract from the latest issue of the Theosophical Publication Society (7 Duke Street, Adelphi, London, W. C.) in which is an elaborate paper on "Keely's Secrets," by Mrs. Bloomfield Moore, wherein the "etheric force" is identified as "dynaspheric" force, and one phase of it considered in its relations to the cure of disease. The secretary of the society, R. Harte, in an interesting introduction to the pamphlet, relates the following curious anecdote:

"A short time ago the mining world in America was seized with an inexplicable excitement. The values of gold mines in particular suddenly rose. Presently it leaked out that a syndicate of the longest-headed and wealthiest mining capitalists were quietly buying up all the cheap and apparently worthless gold mines they could hear of, and the people at once concluded that something was up. Then every one of a speculative turn very knowingly began to buy worthless gold-mining shares at ever-increasing prices, and when the little speculators had gorged themselves to the full extent of their financial capacity they asked 'What next?' No one knew exactly what he was after, and everyone looked to the syndicate for the next move, but the syndicate smiling put its hands in its pockets and whistled! After the fever came prostration. The small fry had not, like the syndicate, bought to hold, so they got first uneasy, then alarmed, and finally panic-stricken. A few weeks before the panic occurred, twelve solid men, millionaires, met by appointment in a certain laboratory in Philadelphia to witness an exhibition of the disintegration of quartz by a new method. They were

mining magnates, who had a tremendous interest in getting the gold out of quartz rock quickly and cheaply. The inventor obliged them by simply touching some blocks of quartz with a little machine he held in his hand; and as he touched each block it instantly crumbled into atomic dust, in which the specks of gold it had contained stood out like boulders in a bed of sand. Then the twelve solid men solidly said: 'Mr. Keely, if you will in the same manner disintegrate some quartz for us in its natural place we will each of us give you a check for —— dollars.' So off they all went to the Katskill Moun ains, and there the twelve solid men pointed out a reef of quartz on the side of a mountain as solid as themselves, and Mr. Keely took out his little machine and said: 'Gentlemen, please take the time.' In eighteen minutes there was a tunnel in that quartz mountain eighteen feet long and four and a half feet in diameter. Then Mr. Keely quietly returned to Philadelphia with his checks in his pocket, and the twelve solid men went from New York to San Francisco to gather in the seemingly 'worthless stock' of mines long disused because of the working expense, thus producing the disastrous effect upon the mining world which we have just seen. [All these men bound themselves to secrecy, and this is the first time that this incident has been made public.] How was the quartz disintegrated? That is one of Keely's secrets."

A Canal Lift.—An engineering work of singular magnitude and importance has just been inaugurated at Arques, near St. Omer, in France. The undertaking so successfully inaugurated is the work of Mr. Edwin Clark, C. E., of Great Marlow, and an associate of Stephenson in the construction of the tubular bridge over the Menai Straits. The work comprises a canal lift, superseding the series of ordinary locks, which at present so seriously impede the traffic on the large canal system communicating with Belgium. The Continental canals are on a much larger scale than our own, the canal boats usually carrying from 210 to 220 tons. The ground at this particular spot rising very rapidly, there are five or six locks in close contiguity, involving great loss of time and great cost in their management. By this invention of Mr. Clark's the canal boats are now lifted the whole height of nearly fifty feet at one operation, occupying only a few minutes of time, and no loss whatever of water. This singular machine consists practically of a gigantic hydraulic press, whose piston is 3 feet 3 inches in diameter, and 50 feet in length, by means of which the boats themselves, actually afloat in an enormous tank or reservoir, are bodily raised or lowered, water and all, to the required height. This reservoir is in reality an actual length of the canal itself, made of wrought-iron plates, separated from the rest of the canal by iron gates, which are opened when it is raised into its proper position at the required height. There are two such presses, the one descending while the other is ascending, and they thus balance each other, and no steam engine or other mechanical power is required, although the weight lifted at each operation, including the water and the loaded barges, is very nearly 1,000 tons. Sixteen hundred barges had already been lifted prior to the public inauguration, the task being performed by a single man, whose only work is the opening and shutting of a small valve, and the operation only occupies a few minutes. A smaller lift on this principle was erected by Mr. Clark some years since in Cheshire, and was then patented, but he has just completed a still larger lift in Belgium, which will be opened during the present month. The introduction of this system will in future totally change the whole character of our canal systems, as a range of high hills may be thus easily traversed without any loss of water from the summit, and the same system is now being adopted in Canada for transporting sea-going vessels across the isthmus which intervenes between the Bay of Fundy and the Gulf of St. Lawrence.—*The Architect.*

Some Old-Time Strikes.—In 1796, 1798 and 1799, the journeymen shoemakers of Philadelphia struck for higher wages and were successful. In November, 1803, a strike occurred in New York City which is commonly known as the "Sailors' strike," and which has been generally considered as the first strike in the United States. A number of sailors struck for an increase of pay from $10 to $14 per month. They marched around the city and compelled other seamen to leave their work, but were put to flight by the constabulary, who arrested their leader and lodged him in jail. The strike was a failure. A very singular strike occurred in 1817 in Medford, Mass. Thacher Magoun, a shipbuilder, notified his men that he would not furnish them with the customary grog, and that no liquor should be used in his ship-yard. The men wrote the words "*No Rum!* No Rum!" upon each stick of timber in the yard, and some of them refused to work, but finally gave in. This was paralleled by a general strike of employés upon the railroad between Reading and Harrisburg, Pa., in 1839, where the demand was for an increase of pay from $1 to $1.12½ per day, and for more whiskey, the allowance being a pint and a half per day to each man, dealt out in nine doses.—*From Report of the Commissioner of Labor.*

The Longest Recorded Shot.—A correspondent of the United States *Army and Navy Journal* asks: "What is the longest piece of ordnance that has ever been successfully fired?" and receives the following answer. "If you include in the term ordnance everything that carries a projectile, we should answer fourteen miles. This is the straight tube conveying natural-gas from Murrayville to Pittsburgh. To clear this tube out a projectile known as the 'gum ball' was inserted in the end at the gas well, closely fitting the interior; the gas was then turned on full force and the gum-ball fired through its full length, coming out at the further end in a few minutes."

A Monument to Semper.—Funds have been collected in Germany for a monument to the famous architect, Semper, to be erected at Dresden. It will adorn the Brühl Terrace, and will be the work of Professor Schilling, the author of the Niederwald monument.

TRADE SURVEYS.

The architects of the country have done as much work this year as they did last. The larger percentage of it has been of the cheaper variety of work where the commissions have not been up to the established rate. Builders engaged in large operations found it to their interest to use the skill of a reputable architect rather than go by "the rule-of-thumb." The architects west of the mountains have been generally busier than the architects east. They have been giving attention to a range of subjects and questions of practical value a little more removed from the strict line of the architect's duty than usual. In other words, the architects are making themselves of more use to the builders and investors than they would be if they simply made drawings and watched the construction. There is a wide field to be filled in this direction and the more practical-minded architects are using the opportunities of increasing their earnings by becoming more useful. Advices from a number of interior points in the Western States furnish the gratifying information that a large amount of small house-building work has been undertaken within the past two or three months. The States wherein this activity is most apparent are between Ohio and Kansas. If we were to seek for the causes of this activity in house building we would find them to be these: First, labor has been well employed for several years past and the accumulation in the building and loan associations are being used in the erection of dwellings. Next, there is a more general desire among the workers of the country to own their own homes. Third, labor organizations, notwithstanding the harm they have done, have done some good in directing the attention of the workers to the necessity of economy if they would eventually become householders. There are some other influences, such as these: The industries have been spreading themselves Westward and Southward. Railroads are opening up new fields. Land is appreciating steadily in value. The centre of population is moving Westward, and builders and investors know that money expended in house-building is more safely invested than in any other direction. At present they count that the investments made have paid well. Industries that have been struggling in cities are now going into rural places where taxes are lower, wages are lower, and cost of living less and distance to markets shorter. It will be an easy thing to multiply towns like these to a great extent. Their objective point is that the inducement is stronger to build houses. The great body of wage-workers, take them altogether, rank higher than they did years ago. Renters more frequently become buyers. The habits of the working people are also improving and that has its effect. Work is becoming more regular. Employers are more disposed to accede and concede where justice admits. Labor is becoming less arbitrary. Both sides are recognizing the existence of certain unwritten laws.

Thus it is that an immense amount of house-building is in progress of which the newspapers and the public generally seem to know but little. The industries are spreading over the country. It would be a safe guess to state that there is at least ten times as much capital invested in rural localities, or what we may so regard, as ten years ago or even less time. All this means that new houses must be built and that they are being built. This work is only begun. The construction of a transcontinental road a few years ago was looked upon as a great thing for business. The construction now of a thousand little houses is looked upon as an insignificant affair. Western architects have found their best fields of work in small towns throughout Ohio, Indiana, Kansas, Missouri and Iowa. If anything should be done now to obstruct this spread of industrial activity there will be a larger amount of house building done next year and year after. The building trades throughout the country are very fairly engaged. Confidence has increased since July 1st. At the opening of the season there was some general apprehension that the limit of house building had been reached. No such feeling is entertained now in well-informed circles. The people of the United States wish more and better houses than they have. Rapid transit in cities and towns is preparing the way for building enterprises. It is no longer necessary to be housed up within a few blocks of a factory. Real estate is cheap and the owners of it are anxious to sell. There is a disposition to encourage builders by reasonable prices throughout the West and South. The lumber trade continues active in those sections and full prices as a rule are paid. Throughout the East there is less demand and the markets are more largely overstocked because of the large supplies from Southern markets from which complications are feared. Shingles and lath have declined this year and manufacturers are complaining that they are barely making the two ends meet. Lake freights have been low enough to encourage traffic if there were any room for its increase. Yellow pine is arriving in large quantities from all North Atlantic ports and its distribution throughout the country is encouraged by moderate prices and the favor with which builders and architects regard it.

The iron trade produces no new features this week. The steel rail-makers held a meeting this week at Long Branch but did nothing of importance. The merchant-steel makers are busier than the other branches of the steel trade owing to the multiplied uses to which steel is put. Four or five immense steel-works are projected and will no doubt be built during the next twelve months. The policy on which manufacturers have been going for some time is to restrict production by keeping prices at a point which will discourage competitors from entering the avenues of production. In some instances where better prices could be secured the advice of trade organizations has been to keep prices down. There has been no further restriction of production within two months. Supply and demand are very nicely gauged. Managers of American industries have succeeded beyond their expectations in harmonizing their conflicting interests, and are maintaining a friendly feeling which will prevent those terrible trade conflicts which have in former years brought disaster to thousands. Trade in general is better organized, and the country's requirements are more clearly understood. The centralization which has been going on has resulted in a conservatism, and is beneficial to all interests. The depression in prices is legitimate and not destructive to the capital engaged. Outside capital is debarred from entering crowded channels by a law it cannot overcome. For this reason the managers of our great industries now predict an even range of prices in the next year or two. They do not believe that there will be many, if any, of the panics which have crossed trade in the past years, and have upset the conclusions of the shrewdest business men. Everything looks favorable for the rest of the year. The political campaign will clear up two or three vexed questions and the law-making parties will take their cue from the verdict that will be given. Our manufacturers of productions for exports have been recently encouraged to increase their efforts for the growing trade in foreign markets. Upwards of one hundred American manufactured products are now staple goods in foreign markets against German and English competition. American manufacturers have taken it too much for granted heretofore that foreign manufacturers possessed advantages which could not be overcome. The efforts of the past few weeks have weakened this belief. Large houses are now contemplating a more thorough canvass.

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